

DANGER ZONE*



Service Manual

DANGER ZONE GAME - OPERATION AND MAINTENANCE MANUAL

**DANGER ZONE
INSTALLATION AND MAINTENANCE**

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DANGER ZONE GAME - OPERATION AND MAINTENANCE MANUAL

FCC WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for class A computing devices pursuant to subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

POWER REQUIREMENT WARNING !

A power supply capable of supplying the following current (or greater) must be used in this game:

7 amps @ + 5.0 VDC
1 amp @ - 5.0 VDC
1 amp @ + 12.0 VDC

RECORD OF SERIAL NUMBERS

Record the game serial numbers and date purchased for future reference and/or game service.

Date purchased: _____

Main Circuit Board S/N: _____

Dual Shaft Encoder circuit board S/N: _____

Program part number (on EPROMs) : _____

Software serial number (on "attract mode" screen): _____

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A. WARRANTY

Seller warrants that its printed circuit boards, monitor and power supply, when furnished with the product and parts thereof are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. Seller's warranty of above parts is subject to the normal use and service of its product. None of the seller's other products or parts thereof are warranted.

If the products described in this manual fail to conform to this warranty, seller's sole liability shall be, as mutually agreed, to replace or repair such products which are returned to seller during said warranty period provided.

CONDITIONS:

- a. Seller must be promptly notified in writing upon discovery by buyer that said products are defective.
- b. Products must be returned prepaid to seller plant.
- c. Seller's examination of said products discloses to seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation or improper testing.

Seller is not responsible for bent pins on ICs not installed by seller's employees. In no event shall seller be liable for loss of profits, loss of use, incidental or consequential damages.

Except for this express warranty, seller disclaims all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, and all other obligations or liabilities on seller's behalf, and it neither assumes nor authorizes any other person to assume for seller any other liabilities in connection with the sale of products manufactured by seller.

NOTICE REGARDING THE USE OF NON-SELLER REPLACEMENT PARTS:

Seller recommends the use of only seller's parts when replacing any malfunctioning component or assembly in the seller's system. For safety and reliability, seller does not recommend or authorize any substitute parts or modifications of seller's equipment. Such alterations may adversely affect game play, cause serious injury, and void your warranty. Unauthorized parts, modifications and non-seller's game conversion kits may also void FCC compliance.

To obtain repair, contact seller at 619-562-7000 between 8 AM and 5 PM Pacific Standard Time to obtain an RMA return authorization number. Affix this number to the outside of the shipping container when returning goods. Return to the above address.

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B. HINTS FOR SUCCESSFUL GAME OPERATION

B. HINTS FOR SUCCESSFUL GAME OPERATION

Take some advice from the game masters. Successful game operation can be simple if you take a minute and read the following hints. It is worth it's weight in aspirin!

1. RUN DIAGNOSTICS

If you are having trouble with a certain feature on your game use the diagnostic feature. Five minutes of diagnostics may save an hour of frustration wondering why a feature does not work. Our software department is the best in the business. They labored long and hard to write diagnostics to thoroughly check out your game. Take the time to follow the diagnostics section and prove to yourself that the entire game is working properly.

Next, play the game a couple of times to verify that all is well.

2. MONITOR OUTPUTS

For future reference the outputs from our system to the monitor are red, green and blue with negative horizontal and negative vertical sync.

3. HOW DO I TURN UP THE SOUND ?

Volume adjustment is easy. Refer to figure 4 and locate VR1 (on main circuit board). Now look at the main board (largest board). Clockwise rotation increases the volume.

C. BOOKKEEPING/DIAGNOSTIC FUNCTIONS

C. BOOKKEEPING / DIAGNOSTIC FUNCTIONS

DANGER ZONE has extensive bookkeeping and diagnostic functions. These functions are explained in the following sections:

1. INVOKING DIAGNOSTICS

With the game running in the attract mode follow these steps:

- a. Press and hold the one-player start button while pressing and releasing the service button (found inside the coin door mounted to the top of the coin box).
- b. Release the one-player start button.
- c. The game screen should now appear. Instructions for selecting and entering the listed functions are displayed at the top of the screen with the five selectable options below them. The game's software version number is shown in the lower left-hand corner of the screen.

2. SELECTING THE DESIRED FUNCTION

The one-player start button selects the desired function. The function has been selected when the display color for that particular function changes. Pressing the two-player start button enters the selected function. Selecting the RESET THE GAME function returns the game to normal operation.

An example of the display is as follows:

MAIN MENU

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

BOOKKEEPING
DIAGNOSTICS
GAME SET-UP
HALL OF FAME
GAME DURATION STATISTICS

RESTART GAME
CANCEL CHANGES AND RESTART GAME

S/N: XXXXXXXX

3. BOOKKEEPING

The bookkeeping screen is displayed when that option is selected and entered from the main menu. Five lifetime counters are shown. These counters are set to zero at the factory and are not resetable by the operator. These counters are:

COINS DROPPED MECH 1- This counter shows the total number of coins that have dropped through the LEFT coin mech.

COINS DROPPED MECH 2- This counter shows the amount of coins that have dropped through the RIGHT coin mech.

TOTAL COINS DROPPED- This is the total number of coins dropped through BOTH mechs.

SERVICE BUTTON PRESSED- The number of times that the service button has been pressed. Pressing the service button to enter the bookkeeping/diagnostic section does not affect this counter.

TOTAL CREDITS GIVEN- The total number of credits the game has given in it's lifetime is shown on this counter. (See the game set-up section of this manual for information on setting the number of coins per credit).

a. PERIOD AND DOLLAR COUNTERS

Three resetable counters, located to the right of the lifetime counters are provided to aid the operator in tracking the games' cash intake over a period of time. These counters are:

1. coins dropped
2. dollars collected

As in the main menu, these options are selected by pressing the one-player start button and entered by pressing the two-player start button. To reset the period and dollar counters for either coin mech, press the one-player until the message "RESET COIN MECH 1 (or 2) DOLLARS COLLECTED" changes color. Then press the two-player start button.

b. SETTING COINS/TOKENS PER DOLLAR

To calculate dollars collected, the bookkeeping system needs to know how many coins/tokens are required to make a dollar. Normally, this number would be 4 for quarter operation. If you operate a location where for example , 6 tokens equal one dollar, then the dollar multiplier should be changed to 6 so that the dollars collected counters will reflect accurately what the game has earned.

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To change the coin "multiplier," use the one-player start button to highlight the COINS PER DOLLAR message for the desired coin mech then use the two-player start button to change the multiplier.

c. EXAMPLE OF SETTING TOKENS PER DOLLAR

An arcade giving 10 tokens per dollar should have the coins/tokens per dollar multiplier set as shown.

An example of the display is as follows:

```
10 COINS PER DOLLAR COIN MECH 1
10 COINS PER DOLLAR COIN MECH 2
```

NOTE: The coins per dollar multiplier does not affect the number of coins per credit or credits per coin. See the game set-up section of this manual for that information.

BOOKKEEPING

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

	LIFETIME COINS	PERIOD COINS/DOLLARS
COINS DROPPED MECH 1	0	0 \$ 0.00
COINS DROPPED MECH 2	0	0 \$ 0.00
TOTAL COINS DROPPED	0	0 \$ 0.00
SERVICE BUTTON PRESSED	0	
TOTAL CREDITS GIVEN	0	

```
RESET COIN MECH 1 DOLLARS COLLECTED
RESET COIN MECH 2 DOLLARS COLLECTED
```

```
SET COINS/TOKENS PER DOLLAR=
4 COINS PER DOLLAR COIN MECH 1
4 COINS PER DOLLAR COIN MECH 2
```

RETURN TO MAIN MENU

4. DIAGNOSTICS

The diagnostic menu is displayed upon entering diagnostics from the main menu. The player can then select the desired function.

An example of the display is as follows:

DIAGNOSTICS

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

BUTTONS AND CONTROL TEST
PROCESSOR MEMORY TEST
VIDEO ALIGNMENT SCREENS
VIDEO MEMORY TEST
SOUND TEST
VIEW BACKGROUND SCREENS

RETURN TO MAIN MENU

a. BUTTONS AND CONTROLS TEST

This test allows the operator to check the game controls and switches. Pressing a button or activating a control causes the description of that button or control to change color on the video screen.

BUTTONS AND CONTROL TEST

PLEASE PRESS THE FOLLOWING BUTTONS=

PLAYER 1 START	CLOSED
PLAYER 2 START	CLOSED
MECH 1 COIN SWITCH	
MECH 2 COIN SWITCH	
SERVICE SWITCH	

FIRE BUTTON
MISSILE BUTTON

HORIZONTAL SCROLLING

VERTICAL SCROLLING

PRESS FIRE AND MISSILE AT THE SAME TIME TO
CALIBRATE TURRET.

PRESS THE PLAYER 2 OR SERVICE BUTTON TWICE TO EXIT.

b. PROCESSOR MEMORY TEST

The processor memory test checks all on-board RAM and PROM memory with the exception of the video memory. The messages TESTING MASTER ROM, TESTING MASTER RAM, TESTING COLOR RAM, TESTING SLAVE PROM, TESTING SLAVE RAM will each appear on the left side of the screen as each of those tests are performed. The result of each test (pass or fail) is displayed on right side of the screen next to the description of that test.

Two error messages may appear during slave memory test, these are COMMUNICATION ERROR and SLAVE NOT RESPONDING. IC's to be checked, in order of priority, are listed below:

- | | |
|------------------------|------------|
| COMMUNICATION ERROR - | a. U19 |
| | b. U21 |
| | c. U45 |
| | d. U60 |
| | e. U62 |
| | f. U64 |
| SLAVE NOT RESPONDING - | a. U10 |
| | b. U3 |
| | c. U1 |
| | d. U2 |
| | e. U20,U18 |
| | f. U61,U63 |

In the case of a failure of a ROM or RAM, the location (U number) of the suspected part is shown on the screen.

The following is an example of the display indicating a U107 failure:

PROCESSOR MEMORY TEST

TESTING MASTER ROM	MASTER ROM	BAD
	CHIP U107	SUSPECT
TESTING MASTER RAM	MASTER RAM	GOOD
TESTING COLOR RAM	COLOR RAM	GOOD
TESTING SLAVE ROM	SLAVE ROM	GOOD
TESTING SLAVE RAM	SLAVE RAM	GOOD

PRESS THE PLAYER TWO START OR SERVICE BUTTON TO EXIT

c. VIDEO ALIGNMENT SCREENS

Three video alignment screens are provided to aid in adjusting the game's video monitor for maximum picture quality. Refer to the video monitor technical manual (not supplied) for technical information and adjustment instructions.

The first screen consists of a white crosshatch pattern. This should be used to adjust screen position, horizontal size, vertical size and focus. Pressing the player two start button advances the display to the next alignment screen.

The second alignment screen is used to adjust the red and green intensity. An eight level (0-7) color scale is shown for each red and green. The monitor should be adjusted so that level zero is black, and one through seven appear as seven distinct levels.

The third alignment screen shows a four level blue color scale. Adjust the blue intensity so that level zero is black and levels one through three show as three distinct levels of blue. Eight other colors are also displayed for reference, they are from 0-7: blue, green, red, cyan, magenta, yellow, gray and white.

d. VIDEO MEMORY TEST

The video memory test checks the foreground video memory. The test appears as a series of colored bars moving across the screen. After each pass (about 5 seconds), the results of the test will be displayed on the screen.

If the test was successful (all RAMs good), the message "VIDEO RAM CHECKS OK" will be displayed for about 1 second and the test will be repeated. Pressing the two-player start button anytime during the test will abort the test and return you to the diagnostic menu.

If the memory test fails, the message "VIDEO RAM TEST FAILED" will be displayed along with the location (U number) of the suspect RAM. In the event that the video error is unreadable, a series of tones will also indicate the suspect chip (see table below).

NUMBER OF AUDIBLE BEEPS	SUSPECT ICs
-----	-----
2	U35 and U36
4	U33 and U34
6	U48 and U49
8	U46 and U47

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e. SOUND TEST

This allows the operator to cycle through all the different sounds in the game and verify that each sound is clear. This will cycle through to the end of the test one at a time.

SOUND TEST

SOUND TO HEAR
EXIT SOUND TEST

PRESS PLAYER 1 TO SELECT SOUND.
PRESS PLAYER 2 TO HEAR SOUND.

f. BACKGROUND AND SCROLLING

This test is set-up to view all of the background screens by using player 1 start to advance each screen or the entire background may be scanned by vertical and horizontal movement of the Turret.

BACKGROUND AND SCROLLING

NOW VIEWING PROMS U70 AND U92

PLAYER ONE ADVANCES
PLAYER TWO EXITS
TURRET VIEWS SCREENS

5. GAME SET-UP

The game option set-up section allows the operator to change various game options. As explained in previous sections, the one player start button selects and highlights the desired function and the two player start button enters or executes the function.

a. COINS PER CREDIT / CREDITS PER COIN

The coinage of each mech may be set to require multiple coins for each credit or give multiple credits for each coin.

To change coinage, follow the example screens below:
(All examples assume 1 coin=25 cents)

For 25 cent play: 1 COIN FOR
 1 CREDIT

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For 50 cent play: 2 COINS FOR
 1 CREDIT

Two plays for 25 cents: 1 COIN FOR
 2 CREDITS

b. EXTRA PLAY

An option is included to award an extra play for the insertion of multiple coins before the game is started.

For example; if the coinage is set as follows:

1 COIN FOR
1 CREDIT
EXTRA PLAY FOR 2 CREDITS

Then the result will be, 1 coin will give 1 credit and 2 coins will give 3 credits. Each additional coin will add one credit.

c. ATTRACT MODE SOUND

This option when selected enables the game sounds during the attract mode.

An example of this is as follows:

GAME SET-UP

SELECT FUNCTION WITH ONE-PLAYER START BUTTON
ENTER FUNCTION WITH TWO-PLAYER START BUTTON

COIN MECH 1
1 COIN FOR
1 CREDIT
NO EXTRA PLAY

COIN MECH 2
1 COIN FOR
1 CREDIT
NO EXTRA PLAY

TWO PLAYER INNING FOR 1 CREDIT _ _ _ _ _ NO
ATTRACT MODE SOUND _ _ _ _ _ YES

RETURN TO MAIN MENU

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d. DIFFICULTY LEVEL

The difficulty level on the game is set by the operator. The levels range from one to eight with eight being the most difficult.

6. HALL OF FAME

This function allows the operator to erase the top player lists from the attract mode.

HALL OF FAME

SELECT FUNCTION WITH THE ONE PLAYER START BUTTON

ENTER FUNCTION WITH THE TWO PLAYER START BUTTON

ERASE HALL OF FAME ON EXIT.NO

RETURN TO MAIN MENU

7. GAME DURATION STATISTICS

Graphs are provided which indicate the number of one and two player games. Average play time is also displayed. These graphs may be reset by selecting the reset options located at the bottom of the screen.

GAME DURATION STATISTICS

SELECT FUNCTION WITH ONE PLAYER START BUTTON

ENTER FUNCTION WITH TWO PLAYER START BUTTON

ONE PLAYER GAME TIME		AVERAGE TIME: 0:00
0:00-1:30	0	
1:31-2:00	0	
2:01-2:30	0	
2:31-3:00	0	
3:01-3:30	0	
3:31-4:00	0	
4:01-4:30	0	
4:31-5:00	0	
5:01-5:30	0	
5:31-6:00	0	
6:01-6:30	0	
6:31-7:00	0	
7:01-UP	0	

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TWO PLAYER GAME TIME	AVERAGE TIME= 0:00
0=00-3=00	0 :
3=01-4=30	0 :
4=31-6=00	0 :
6=01-7=00	0 :
7=01-8=00	0 :
8=01-9=00	0 :
9=01-10=00	0 :
10=01-12=00	0 :
12=01-15=00	0 :
15=01-UP	0 :

RESET PLAYER 1 STATISTICS
RESET PLAYER 2 STATISTICS

RETURN TO MAIN MENU

D. SYSTEM TROUBLESHOOTING GUIDE

The entire Cinemat game system can be broken down into major groups. A brief guide to troubleshooting each section follows:

1. INPUT/OUTPUT FUNCTIONS:

a. MONITOR

1. No raster (i.e. black screen)

a. Check AC supply to monitor. If there is no power at the monitor, trace the wiring back to the isolation transformer and/or verify that power is reaching the transformer.

b. Check monitor fuses.

2. Display scrolls (apparent synchronization problem).

a. Check monitor alignment adjustments.

b. Check RGB and synchronization signals on PCB connector and trace through to the monitor.

3. Black screen

a. Check for +5.0 VDC at circuit boards.

b. Check connectors are securely seated and in the proper position.

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4. White or checkerboard screen.
 - a. Check for +5.0 VDC on P4 - 3 through 7. If any of these signals are low, replace U114 (74LS08). If this fails, replace U119 (74LS257).
 - b. Check the clock signal on the master Z80 (U99-6), BASEBALL, THE SEASON II I/O and Memory Expansion Board (U13), REDLINE RACER Sound Board (U14).
 - c. Check reset on the Z80 (U99-26). This signal should normally be high and go low when the reset button is pressed.
5. White or red vertical lines close together on entire screen or half of screen.
 - a. Check video RAMs U33 through U36 and U46 through U49. Refer to sheet 11 and 18 on schematic.
6. Vertical lines on playing field (background).
 - a. Check signals on U81 through U83 (74LS166's).
 - b. Regarding other background problems, check the position of JP2 Jumpers, swap U56, (74LS461) with U60, see if problem disappears.
7. White vertical bars, usually on half of screen sometimes with an audio buzz.
 - a. Caused by excessive temperature. Swap U45 with U23 and/or U60 with U22 (74LS461's).
8. Intermittent flashing video or color changes.
 - a. Check for +5.0 VDC at circuit boards. TP1 and TP2 (+5 VDC)
9. Picture freezes.
 - a. Check for +5.0 VDC at circuit boards. TP1 and TP2 (+5 VDC)
 - b. Check Z80s (U1 and U99). They should be Zilog Mostek devices with a "B" suffix (6 MHz). If not call for replacement.
 - c. Check for damaged sockets on master EPROMs and master CPU.

10. Drifting pattern (any color).

- a. Check connector and signals on P1.
- b. Sign of synchronization problems. Check DCLK.
- c. Check U40 (RGS09), U42 (RGS07), and U43 (RGS08).

b. BUTTONS JOYSTICKS AND COIN COUNTERS.

- 1. A careful visual inspection of the buttons, harnesses and connectors is advised.
 - a. Inspect harness crimps.
 - b. Check for broken wires.
 - c. Check for broken solder joints at the termination point.
- 2. Trace signals through back to the input IC on the PCB.

2. ELECTRONICS

a. MAIN BOARD ELECTRONICS.

- 1. Problems can sometimes be traced to a bad CPU or crystal. Check the master and slave CPU's and their associated components.
- 2. Check EPROMs for background and foreground display and the associated video timing logic.
- 3. Check power at the ICs.

b. ADD ON BOARD(S) THAT CONTROL GAME SPECIFIC FUNCTIONS.

- 1. Again, check for functions specific to the board.
- 2. Check all ICs for proper socket installation.
- 3. Check power at the ICs.

3. GENERAL KNOWLEDGE

- A. Proper voltage input jumpering on the board is critical! Follow the instructions on this carefully. A symptom of improper jumpering is an audio buzz or no audio. Check for 12.0 to 15.0 VDC at U122-5 (audio amp). Refer to Power Supply Modification section of manual. NOTE: If your speaker is not connected, you will not

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hear any sound! Seriously, try adjusting the audio volume control pot (VP1). See section B-3 above on adjusting the volume.

B. GAME POWERS UP WITH GARBAGE ON THE SCREEN - NO BUTTONS FUNCTION - AUDIO MAY BUZZ

1. Remove P4 and P5 and reset system (push button on main board). If picture appears, the problem may be a stuck coin switch, button or bad harness or ground connection.
2. Visually inspect connector crimps and wire colors.
3. Check for + 5.0 VDC at board.

C. A WORD ABOUT COIN COUNTERS:

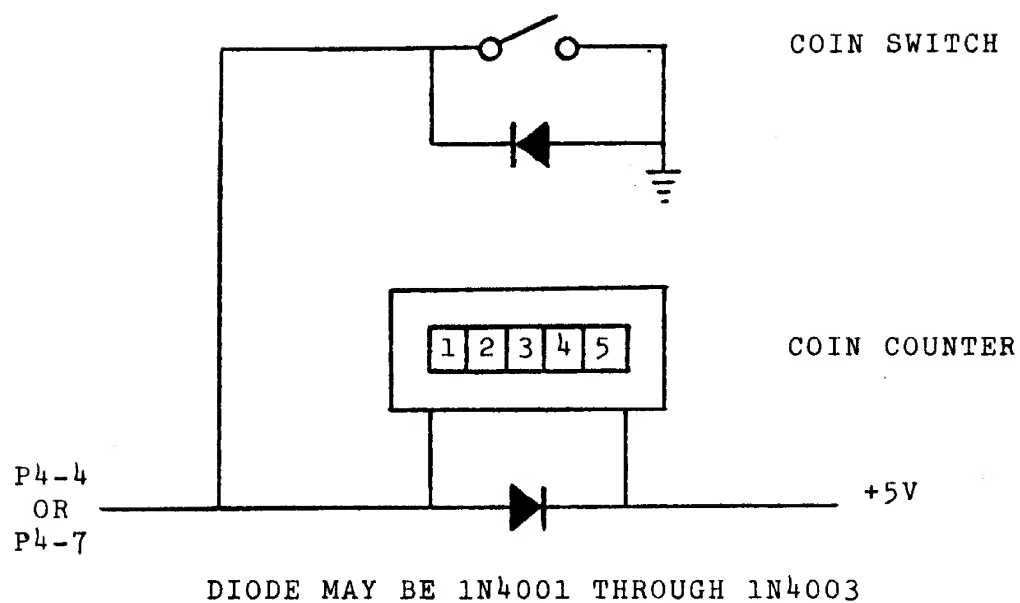
Do not use mechanical coin counters in any kit or dedicated game. These devices produce an inductive "kick" that will damage components on the circuit board(s). Problems caused by this are checkerboard video. A quick check to see if this is your problem is look at the "NMI not" signal on both Z80s (pin 17). If a low output is observed, try replacing U114 (74LS08) or if needed, U119 (74LS157).

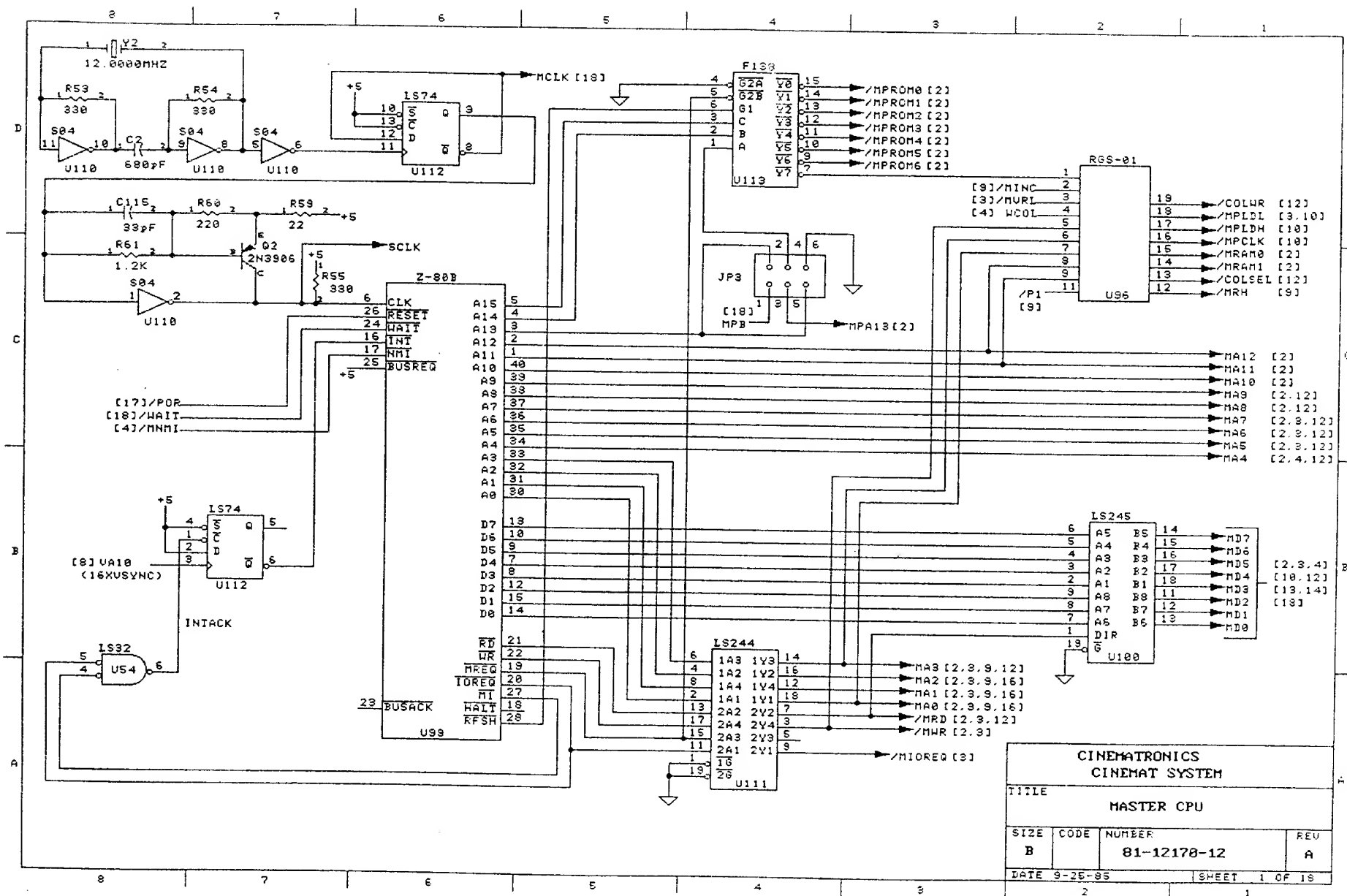
The bookkeeping on our games is very accurate and includes number of coins dropped and dollars earned.

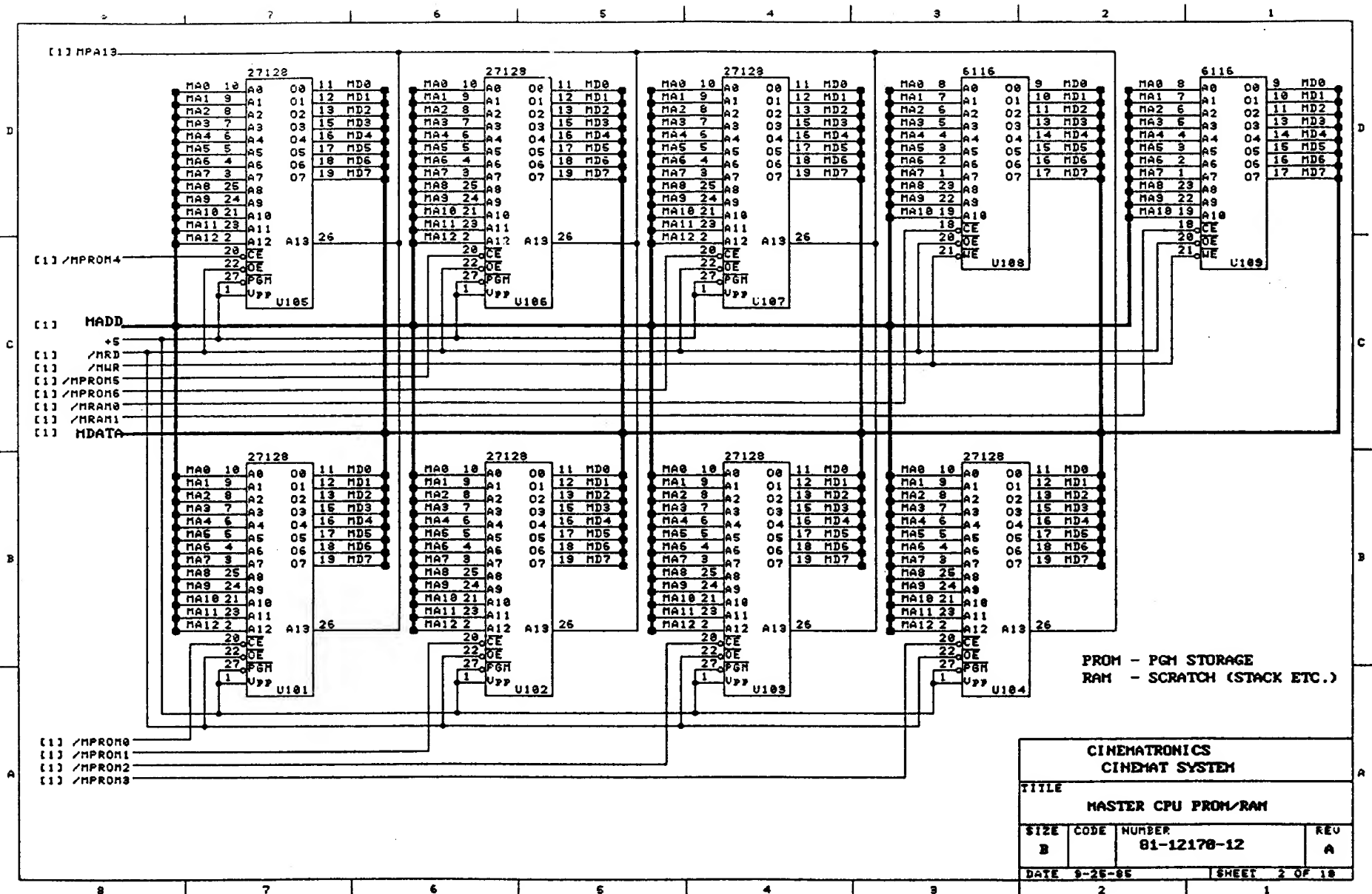
If you must install a coin counter, the next page shows a simple hookup using diode protection.

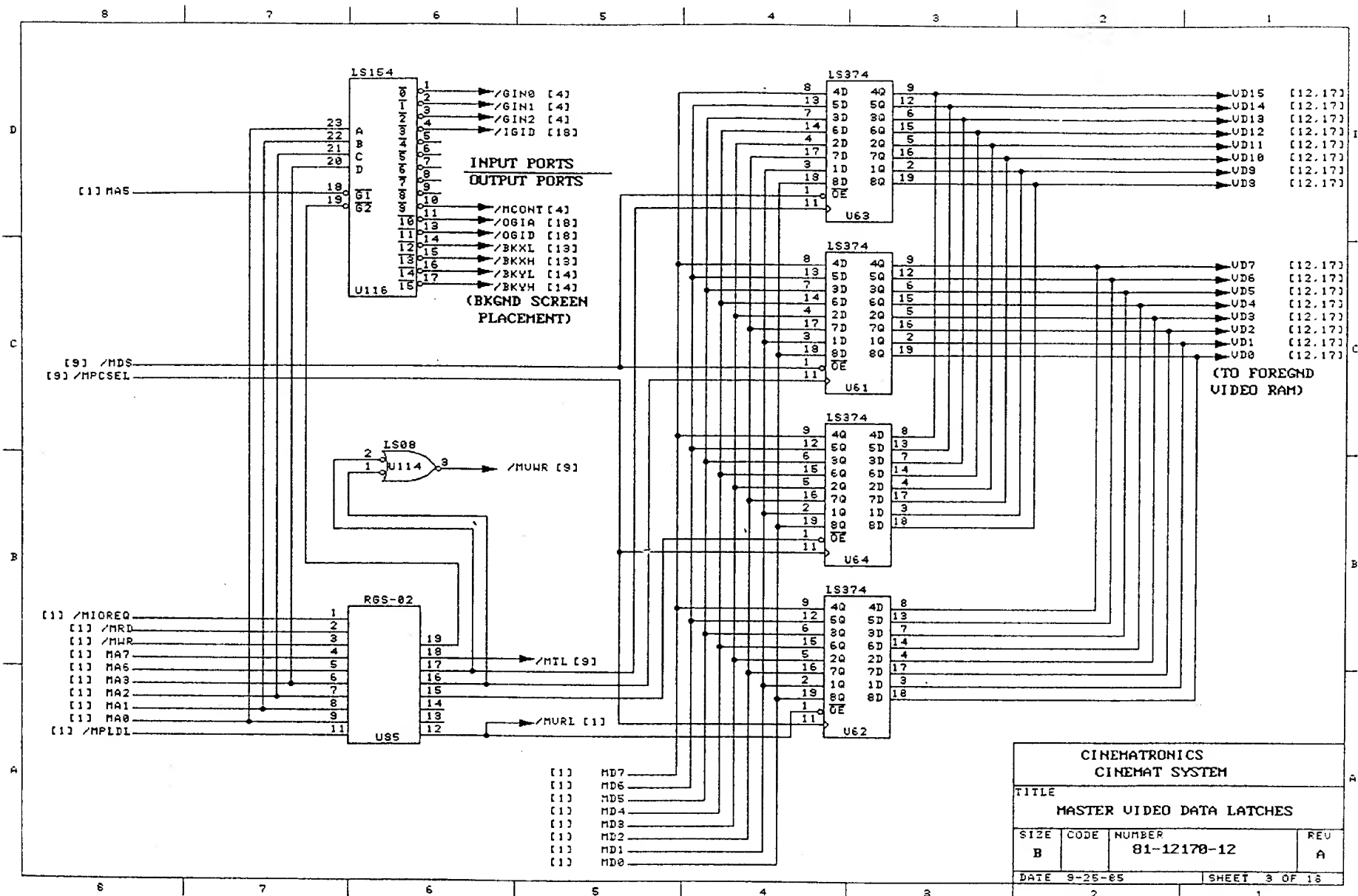
COIN COUNTER SURGE PROTECTION CIRCUIT

* IF YOU MUST INSTALL A COIN COUNTER

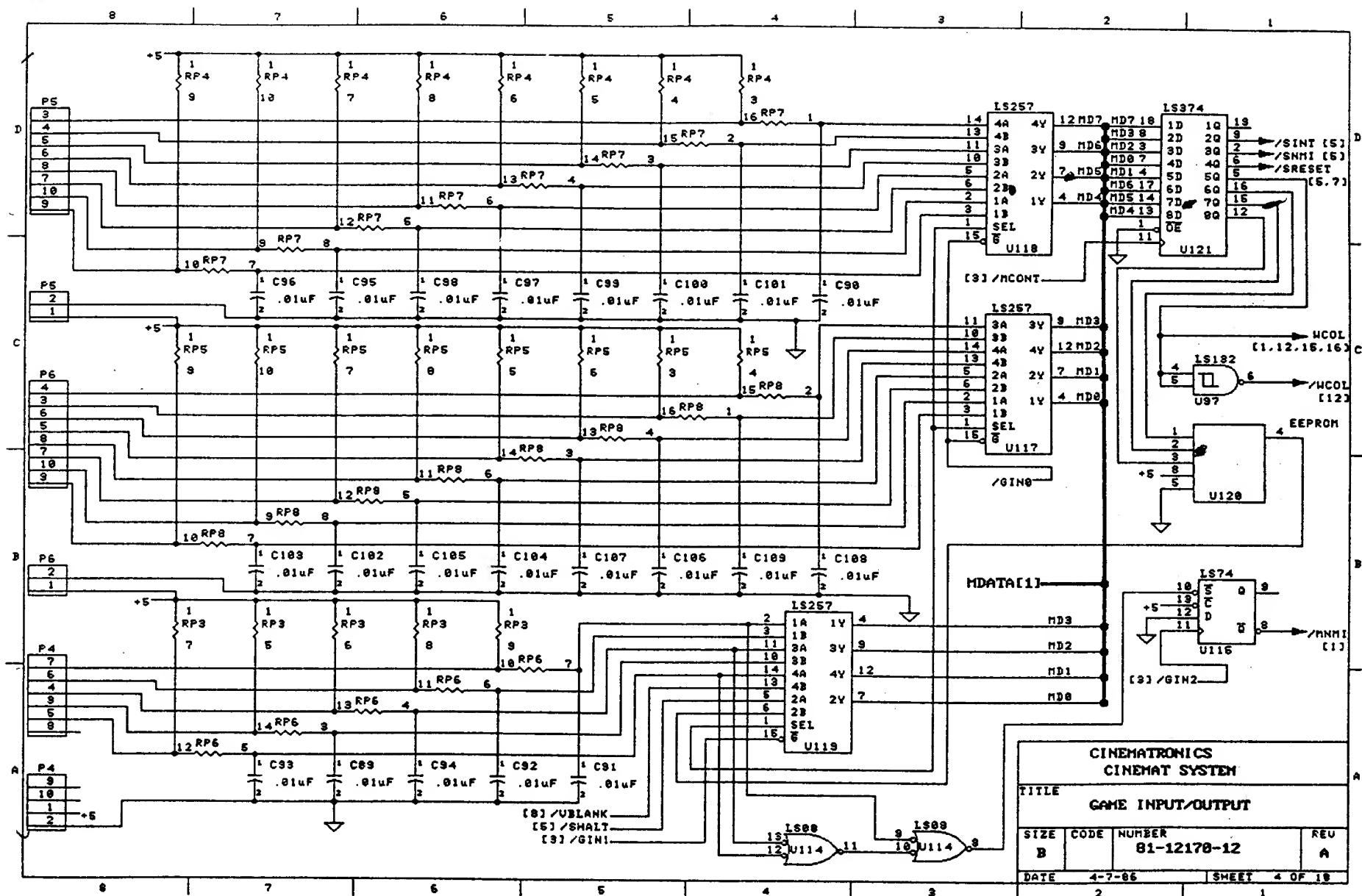


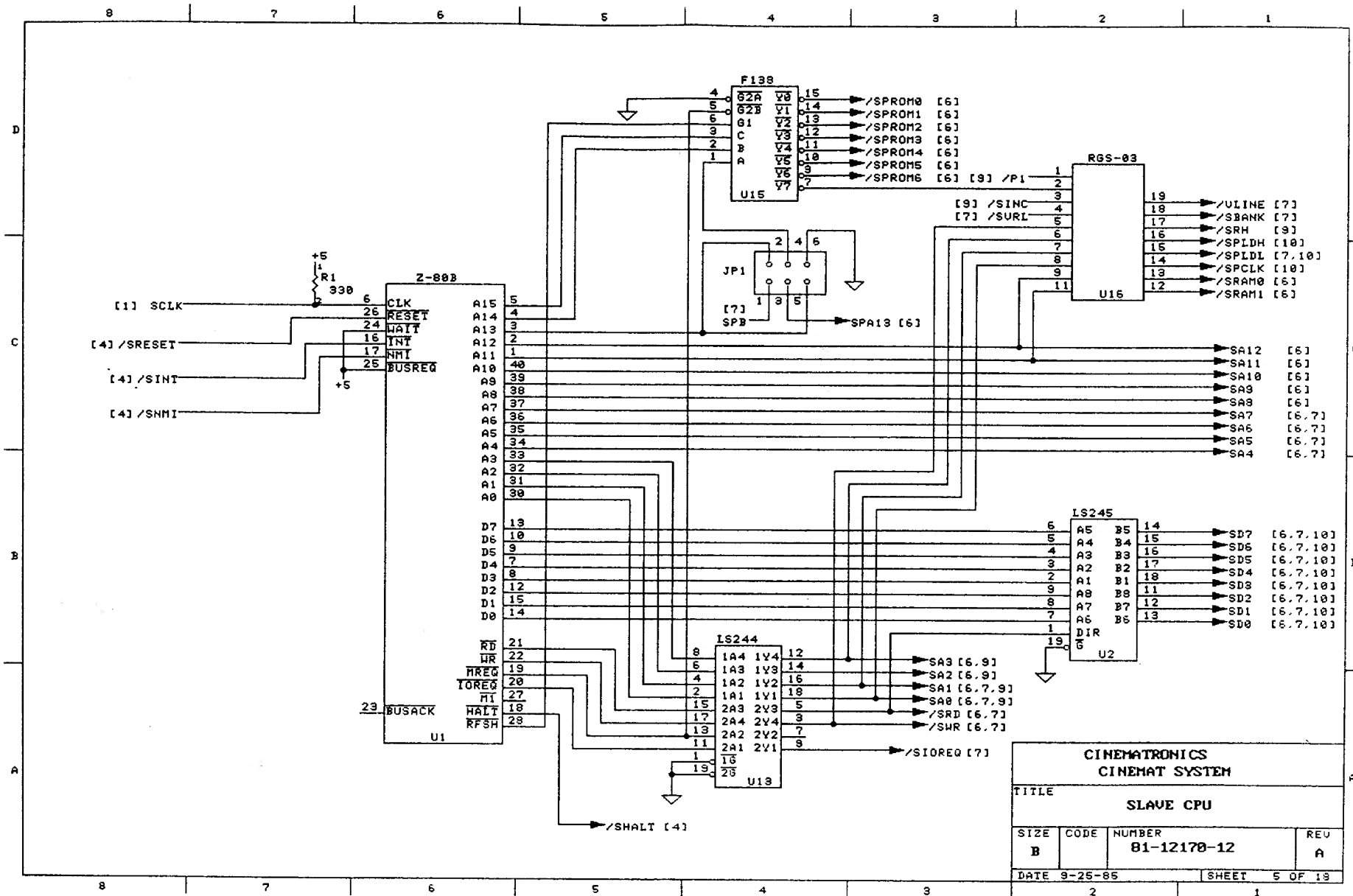


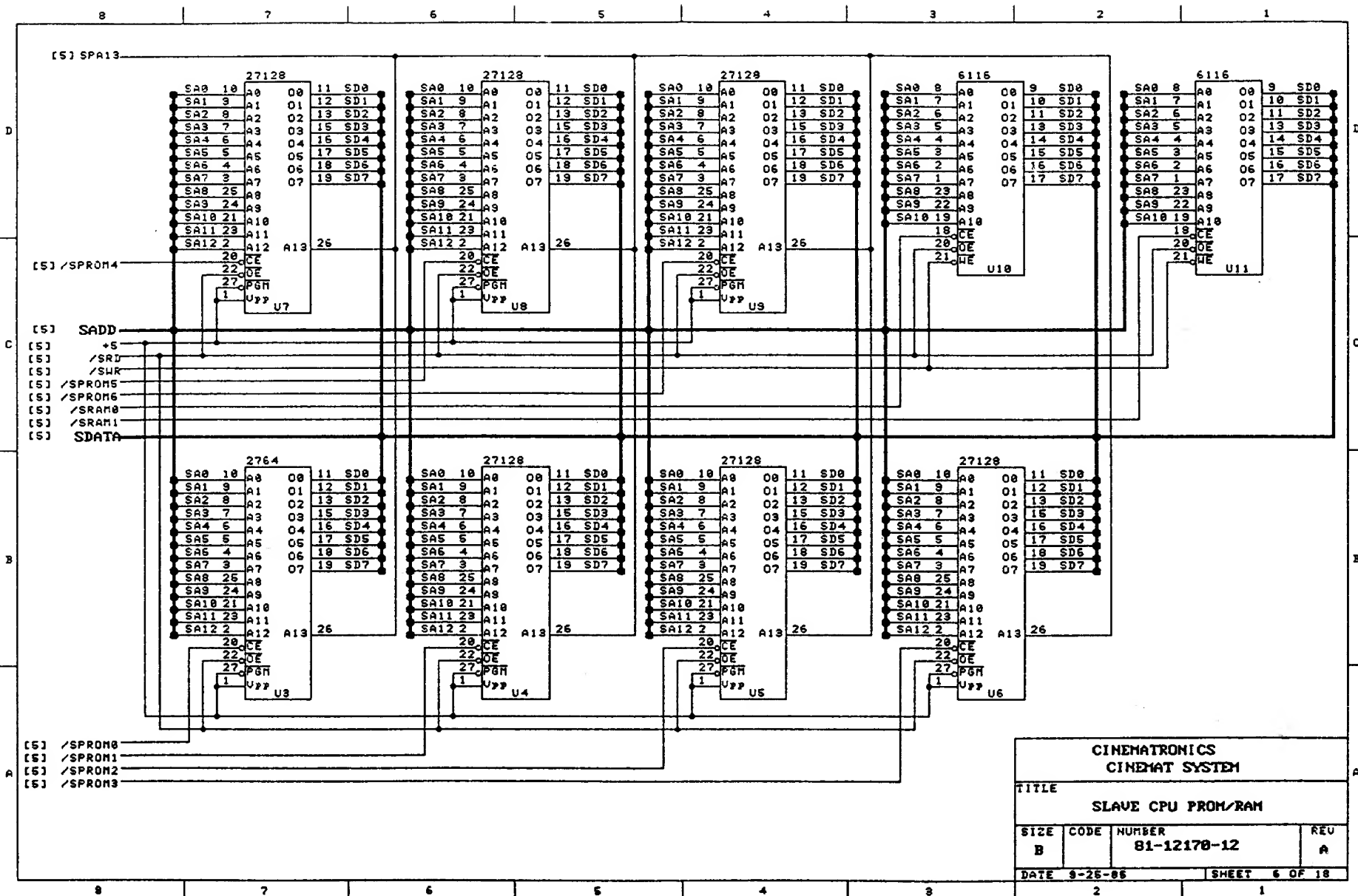


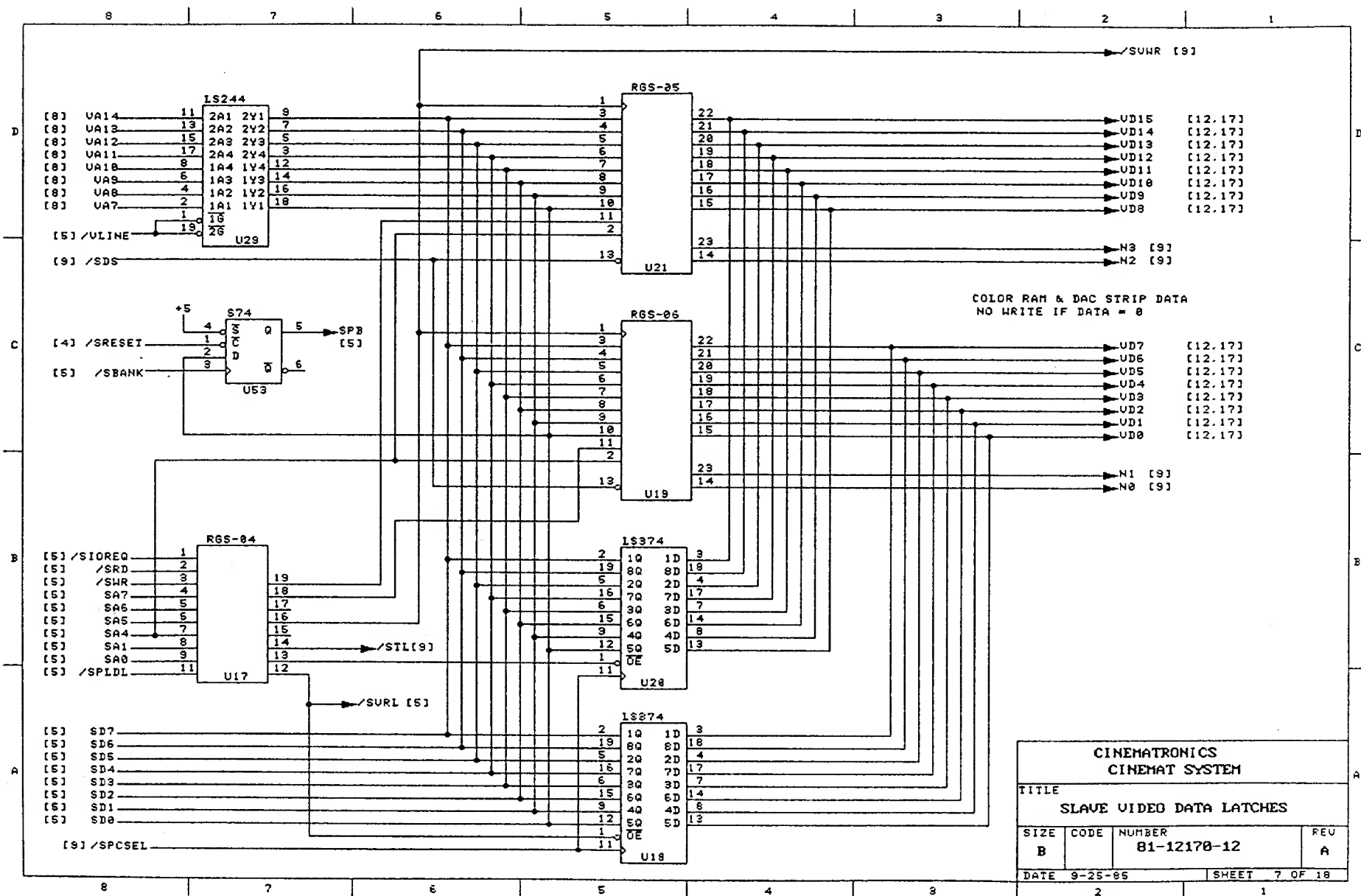


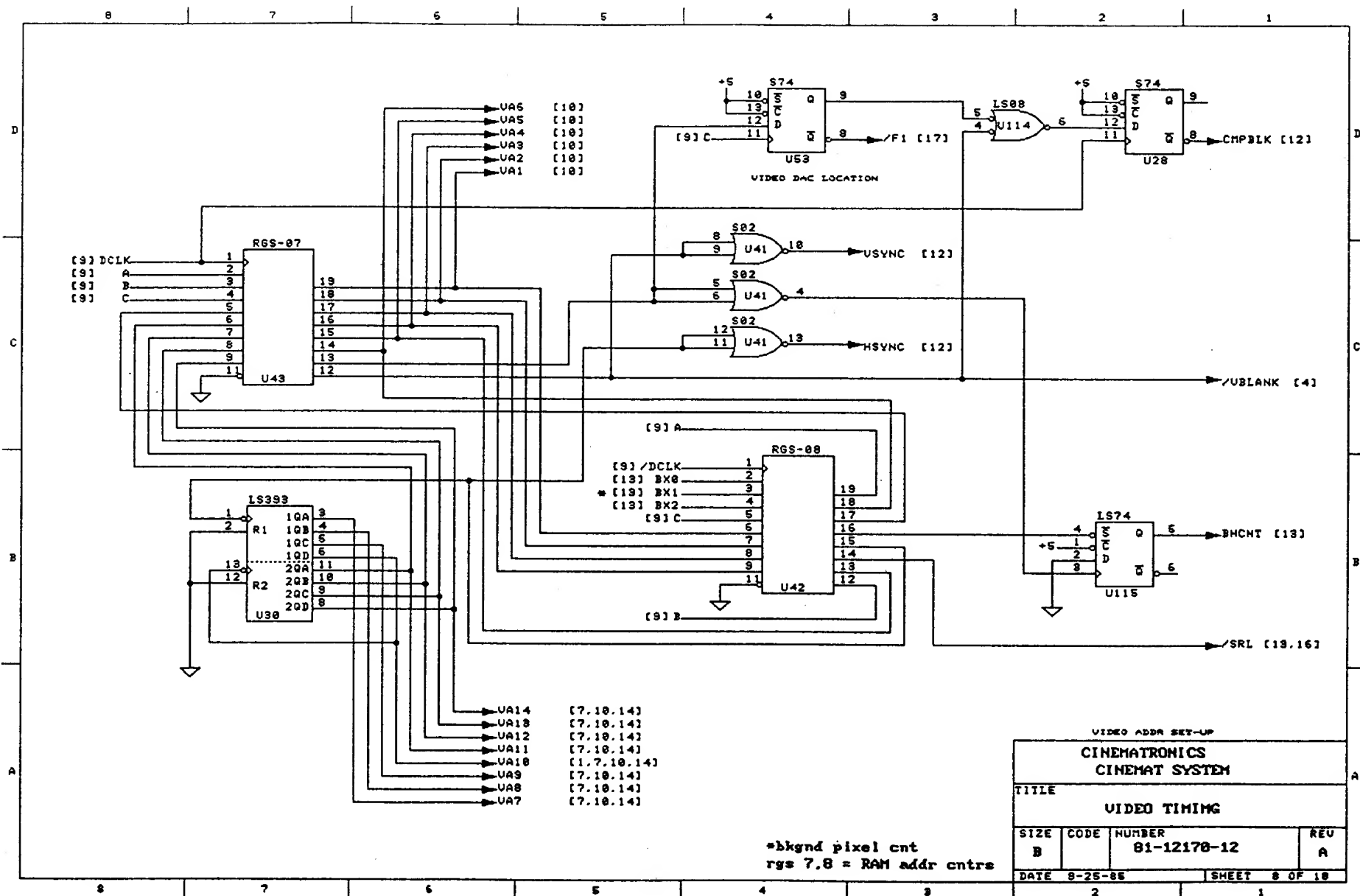
CINEHATRONICS CINEMAT SYSTEM			
TITLE			
MASTER VIDEO DATA LATCHES			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-25-85		SHEET 3 OF 16	

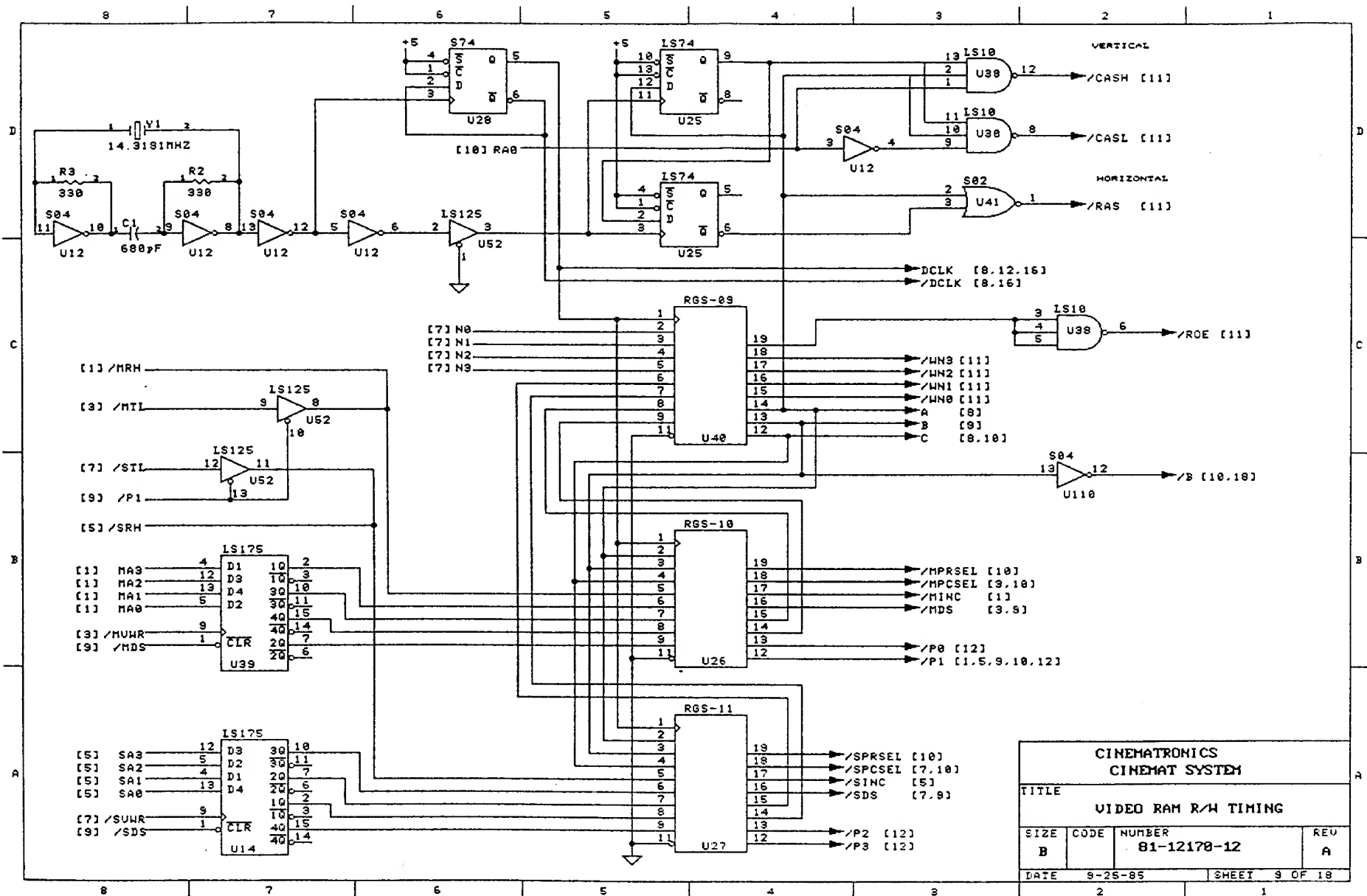


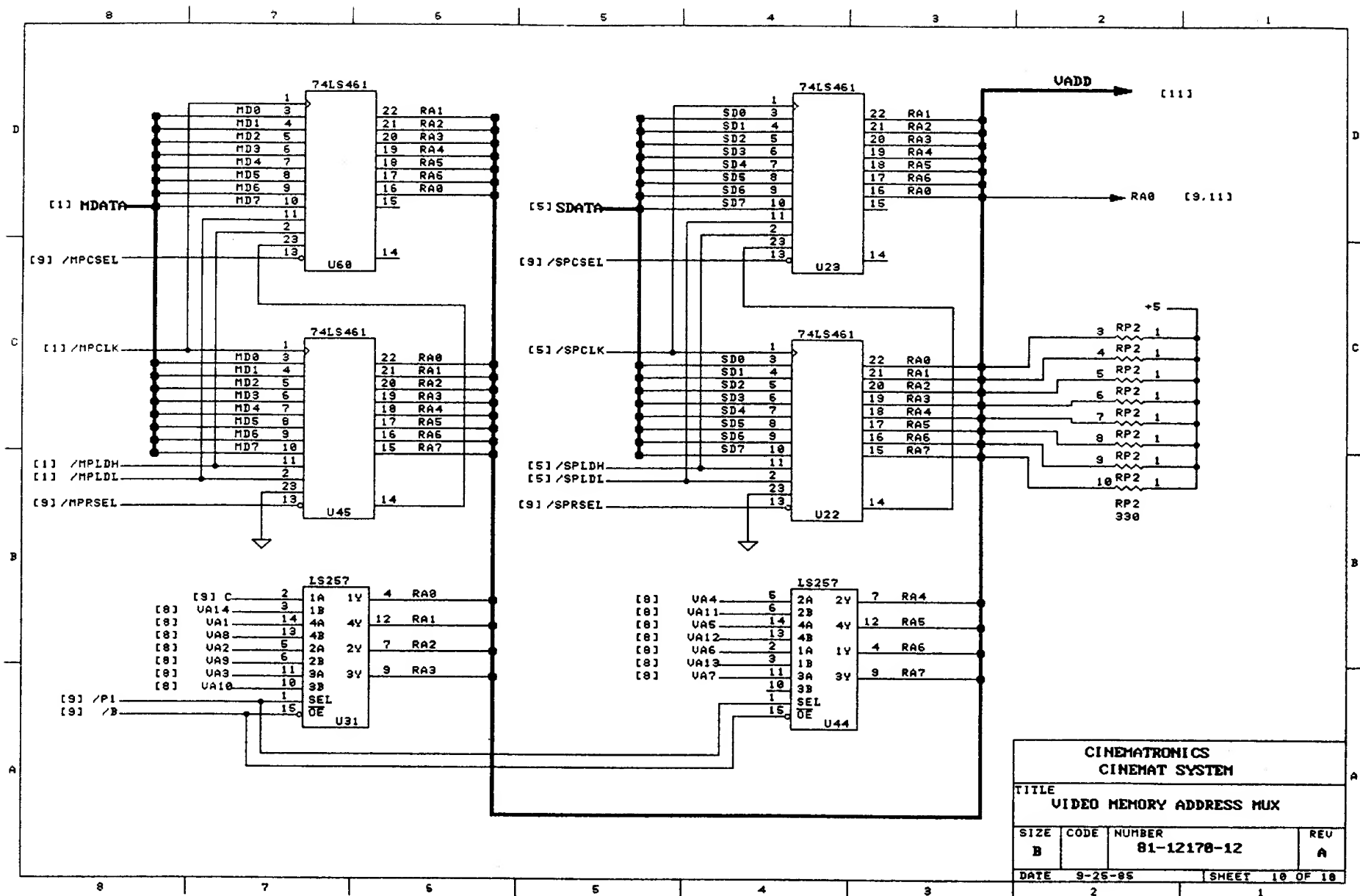


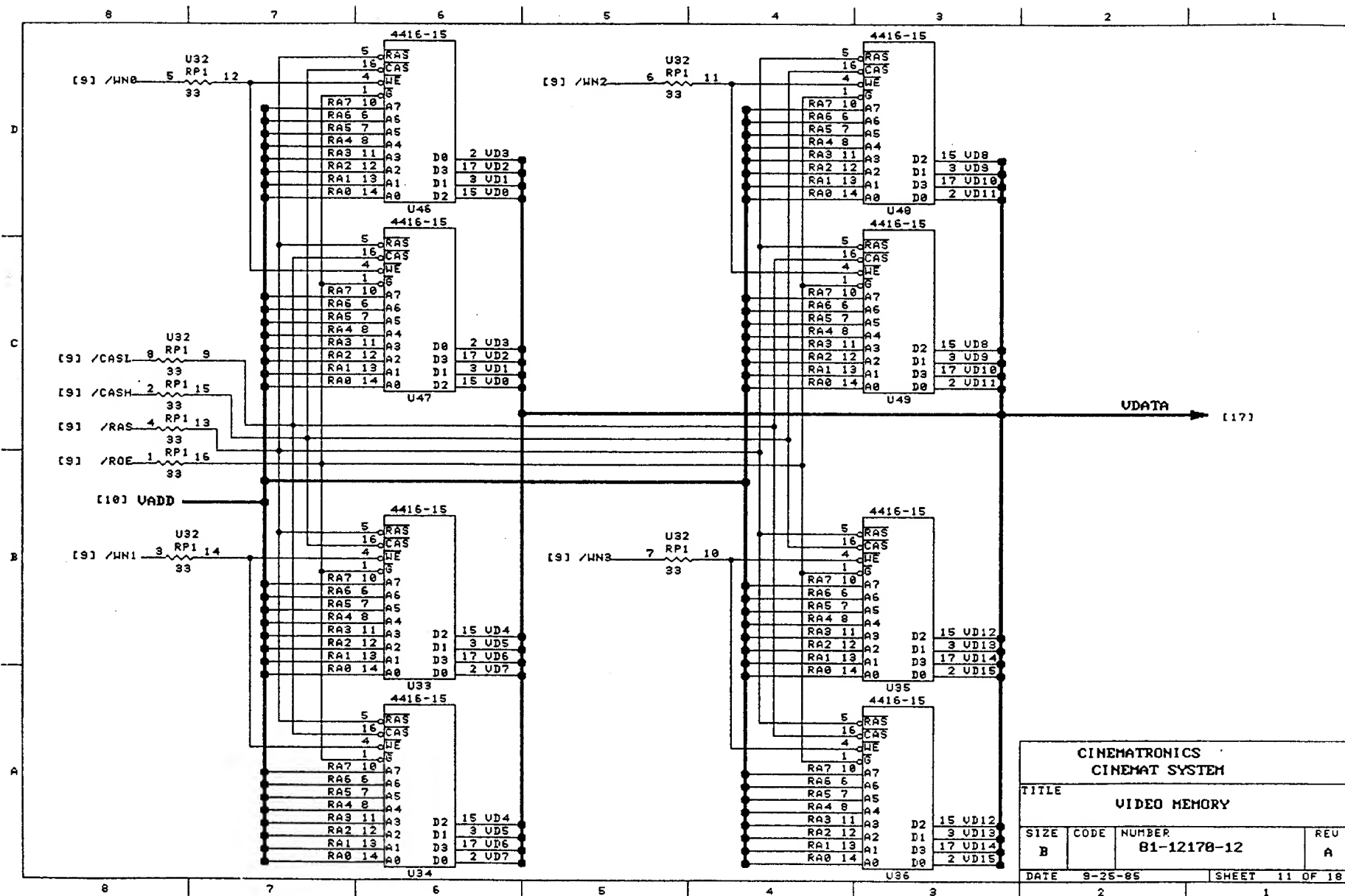




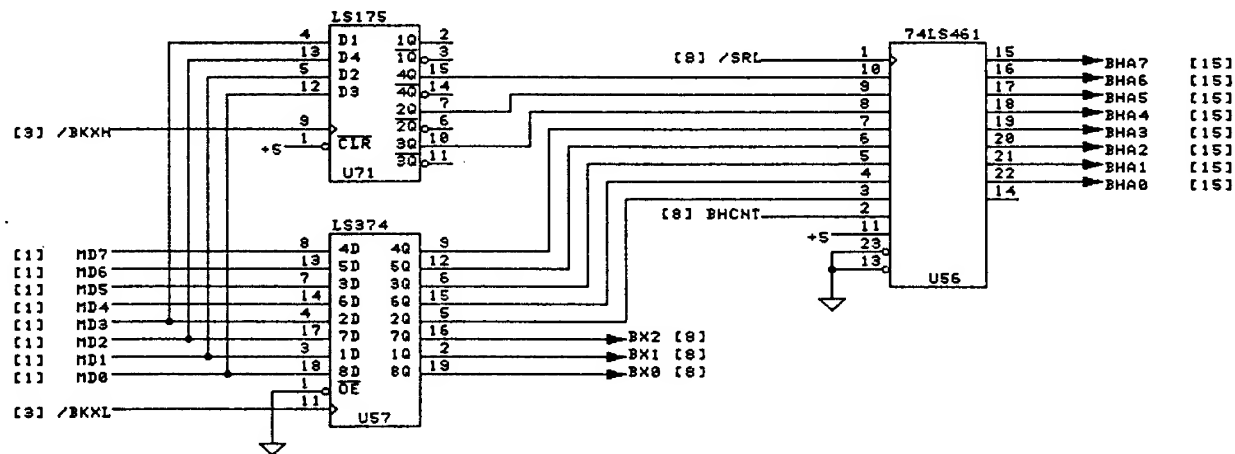






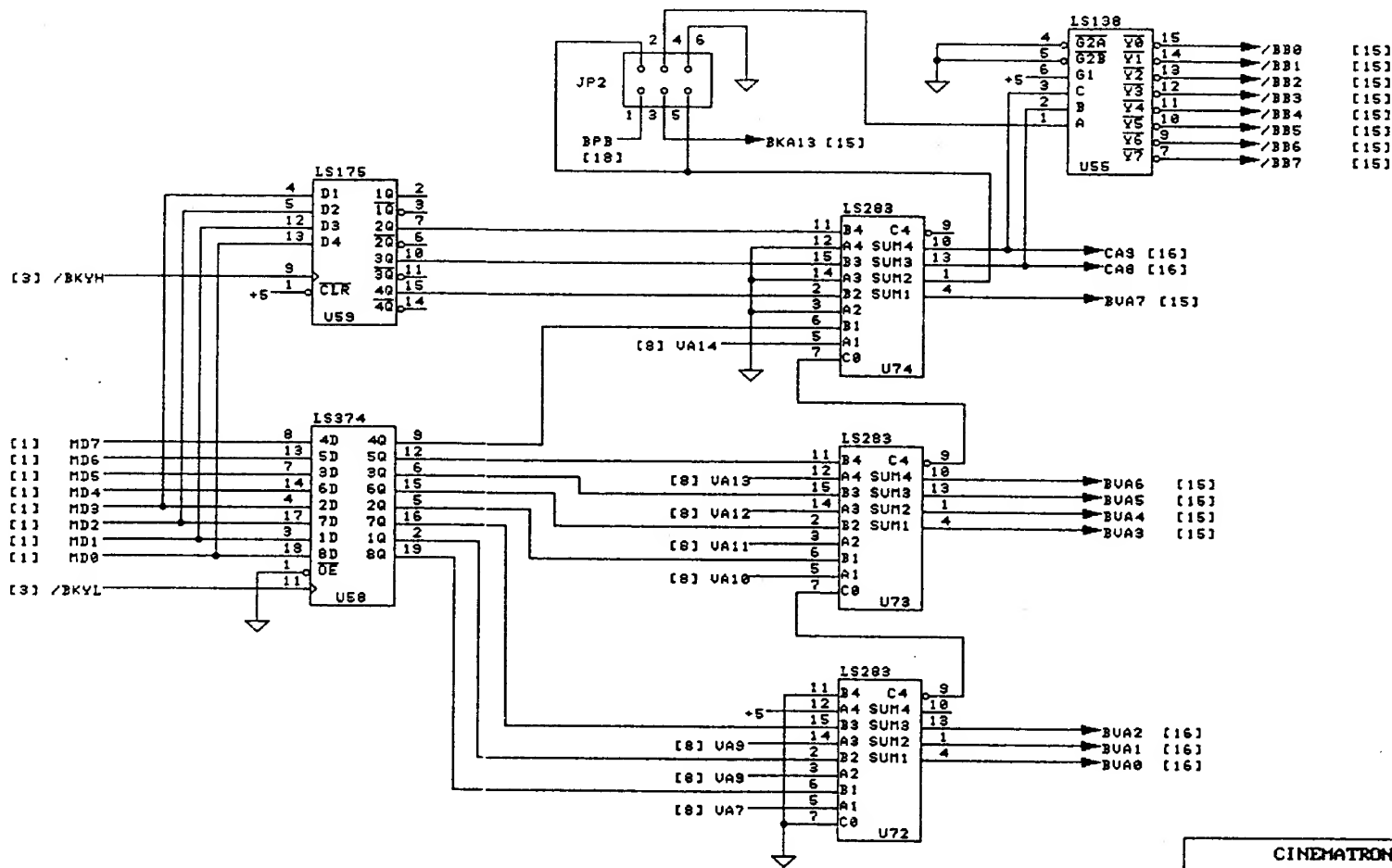


CINEMATRONICS CINEMAT SYSTEM			
TITLE VIDEO MEMORY			
SIZE	CODE	NUMBER	REV
B		81-12178-12	A
DATE		9-25-85	SHEET 11 OF 18



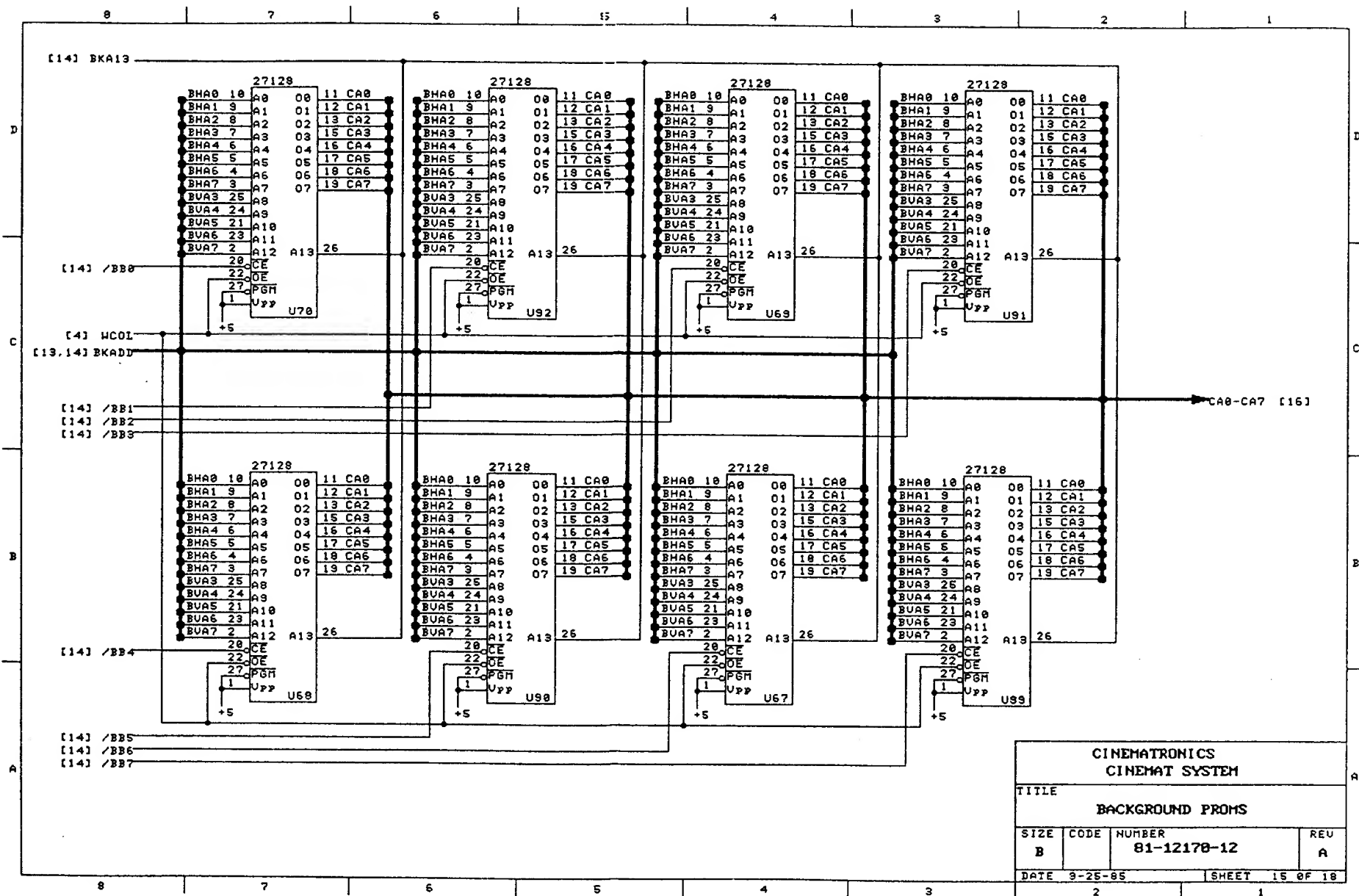
CINEMATRONICS CINEMAT SYSTEM			
TITLE			
BACKGROUND HORIZONTAL ADDRESS			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-25-85		SHEET 19 OF 19	

8 7 6 5 4 3 2 1

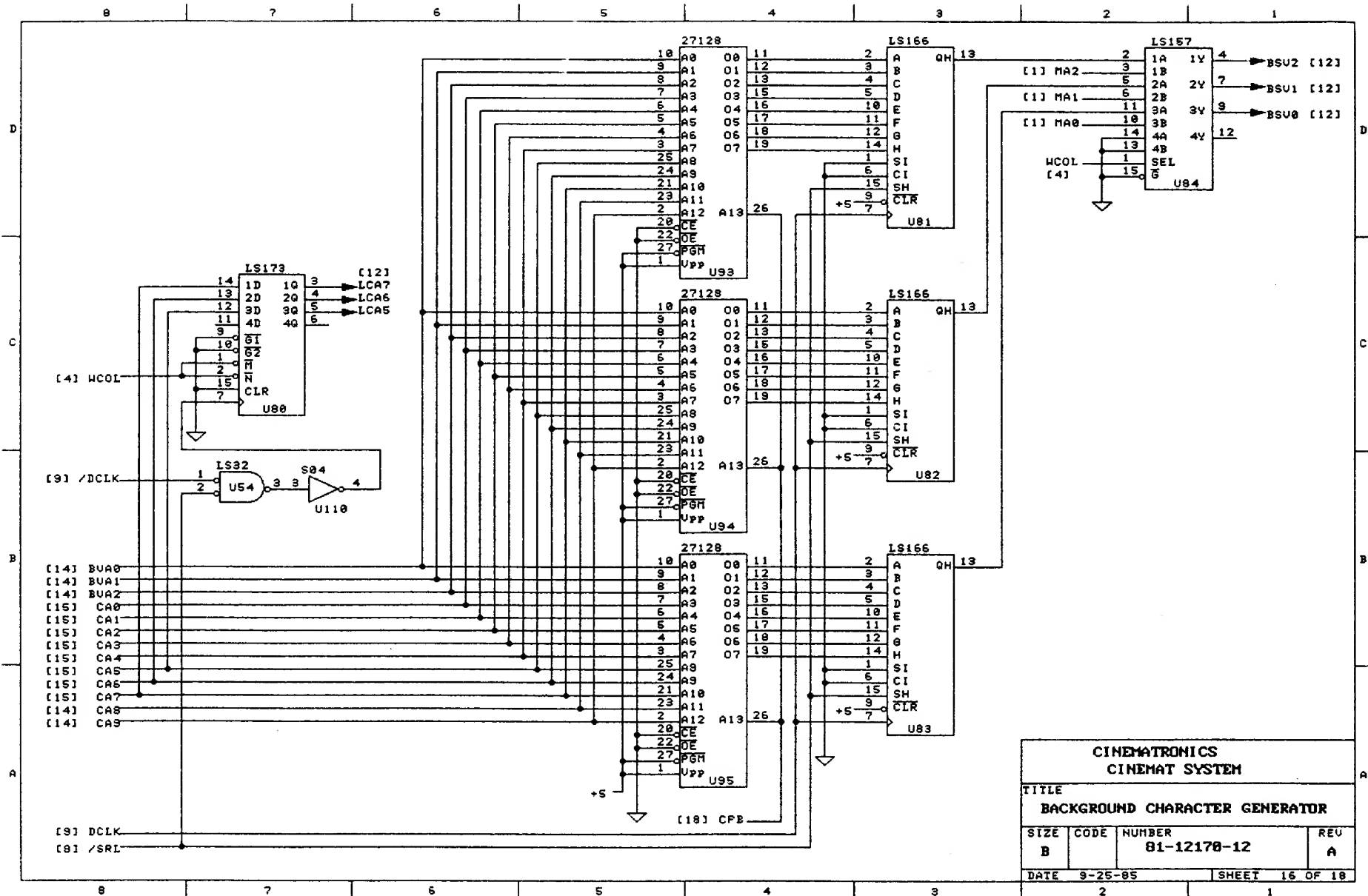


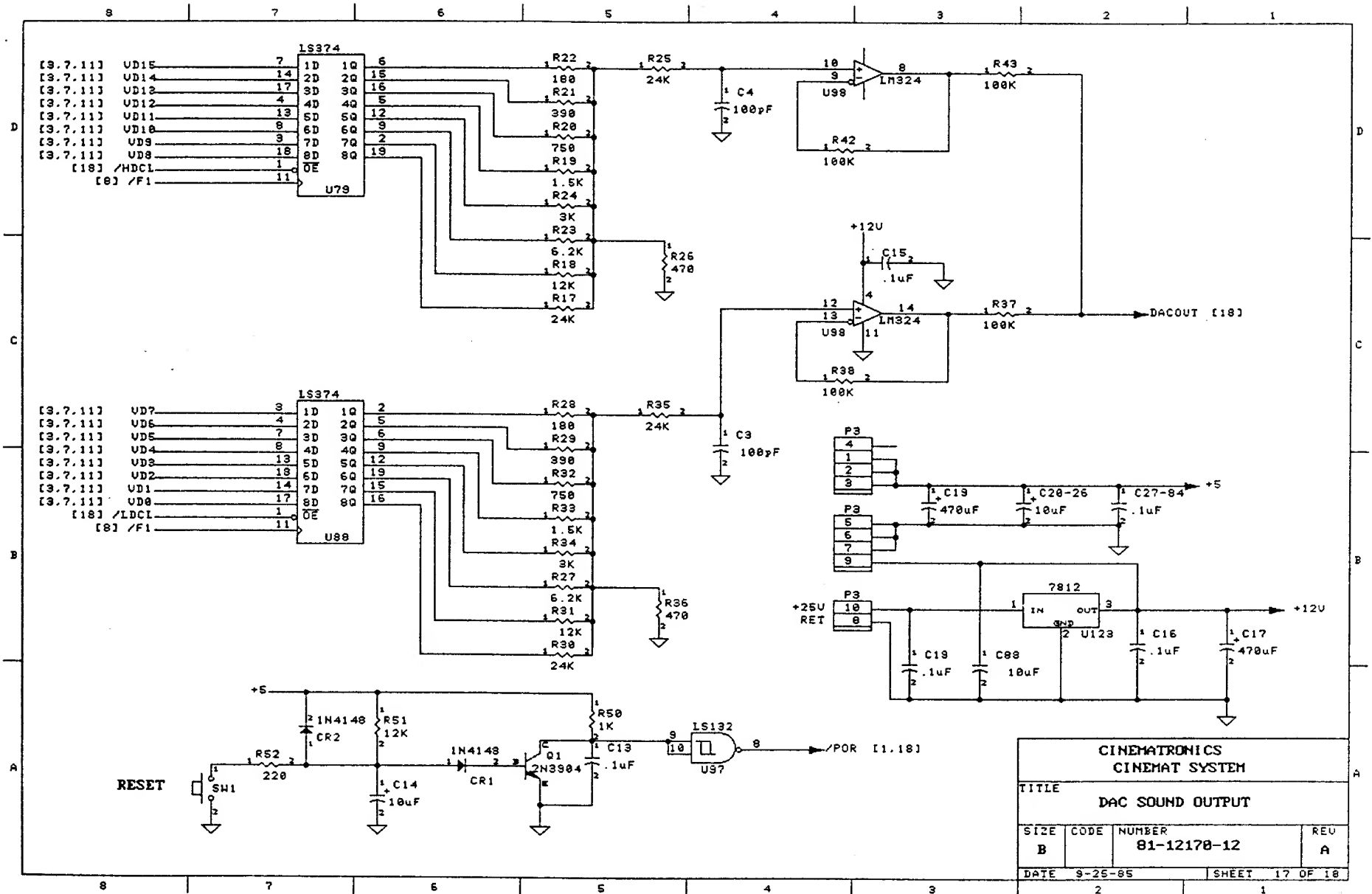
CINEMATRONICS CINEMAT SYSTEM			
TITLE			
BACKGROUND VERTICAL ADDRESS			
SIZE	CODE	NUMBER	REV
B		81-12170-12	A
DATE 9-25-85		SHEET 14 OF 18	

8 7 6 5 4 3 2 1

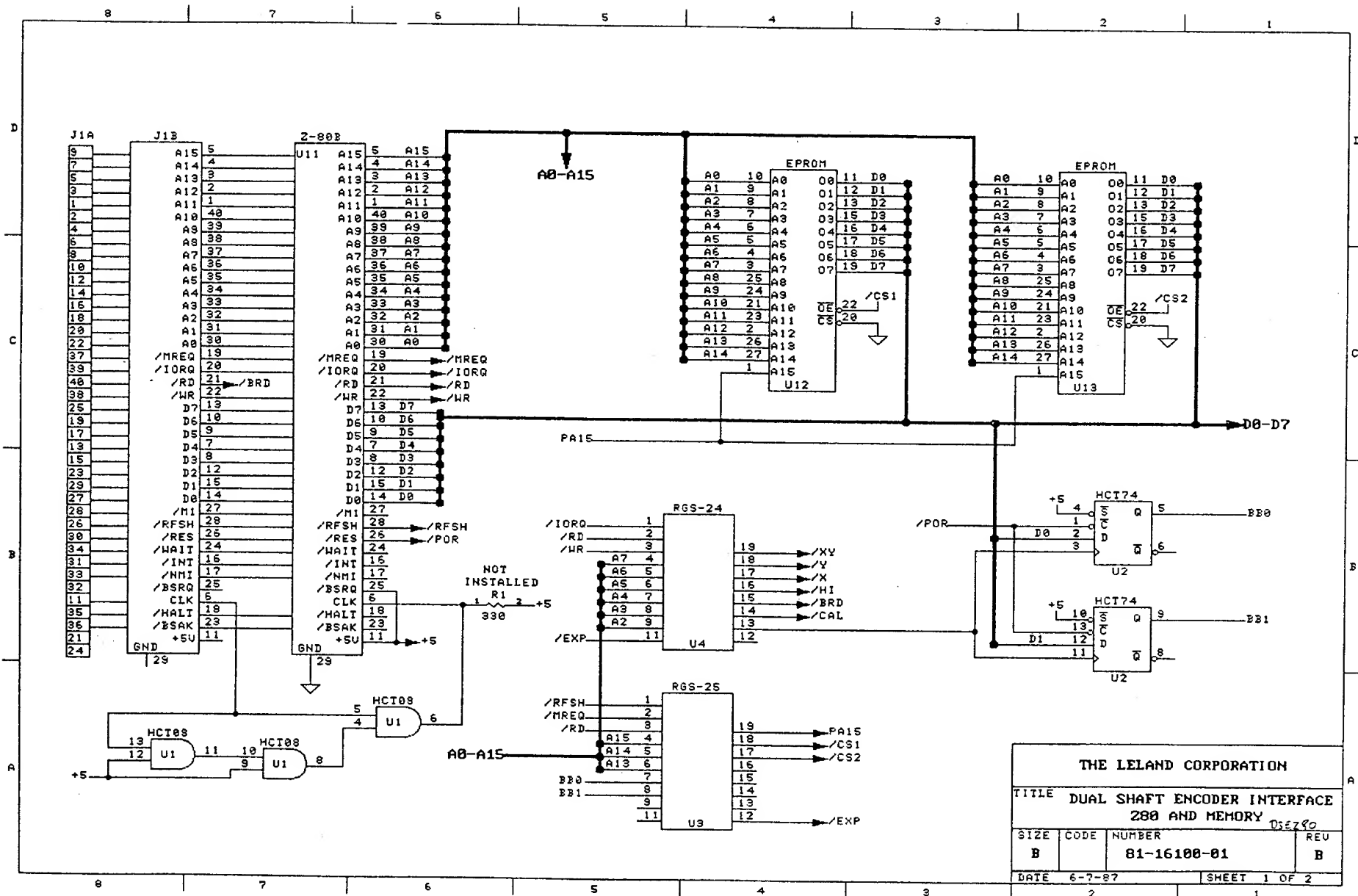


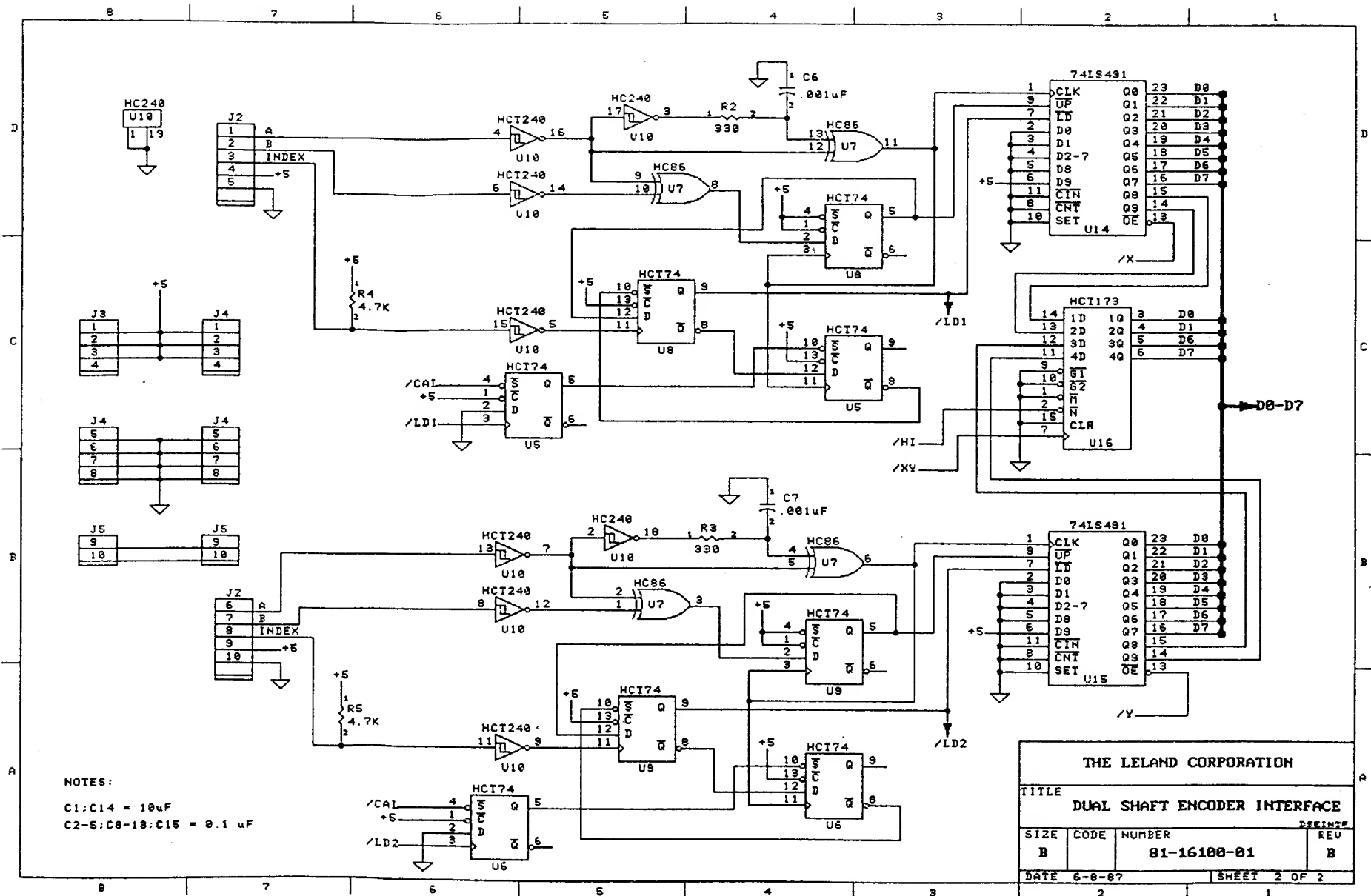
CINEMATRONICS CINEMAT SYSTEM			
TITLE			
BACKGROUND PROMS			
SIZE	CODE	NUMBER	REV
B		81-12178-12	A
DATE 9-25-85		SHEET 15 OF 18	

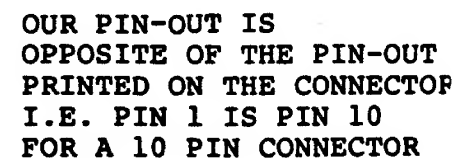




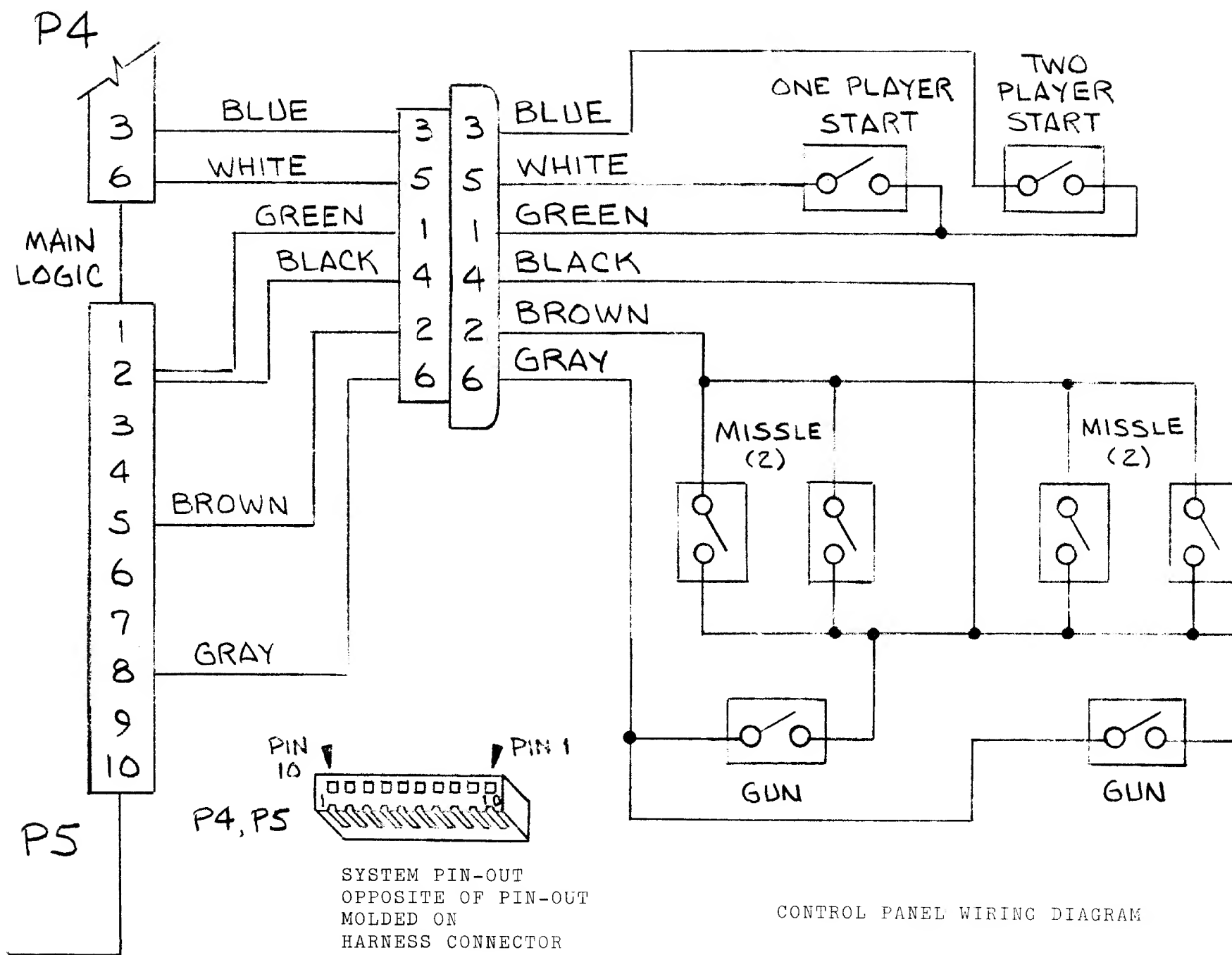
CINEMATRONICS CINEMAT SYSTEM			
TITLE			
DAC SOUND OUTPUT			
SIZE	CODE	NUMBER	REV
B		81-12178-12	A
DATE 9-25-85		SHEET 17 OF 18	







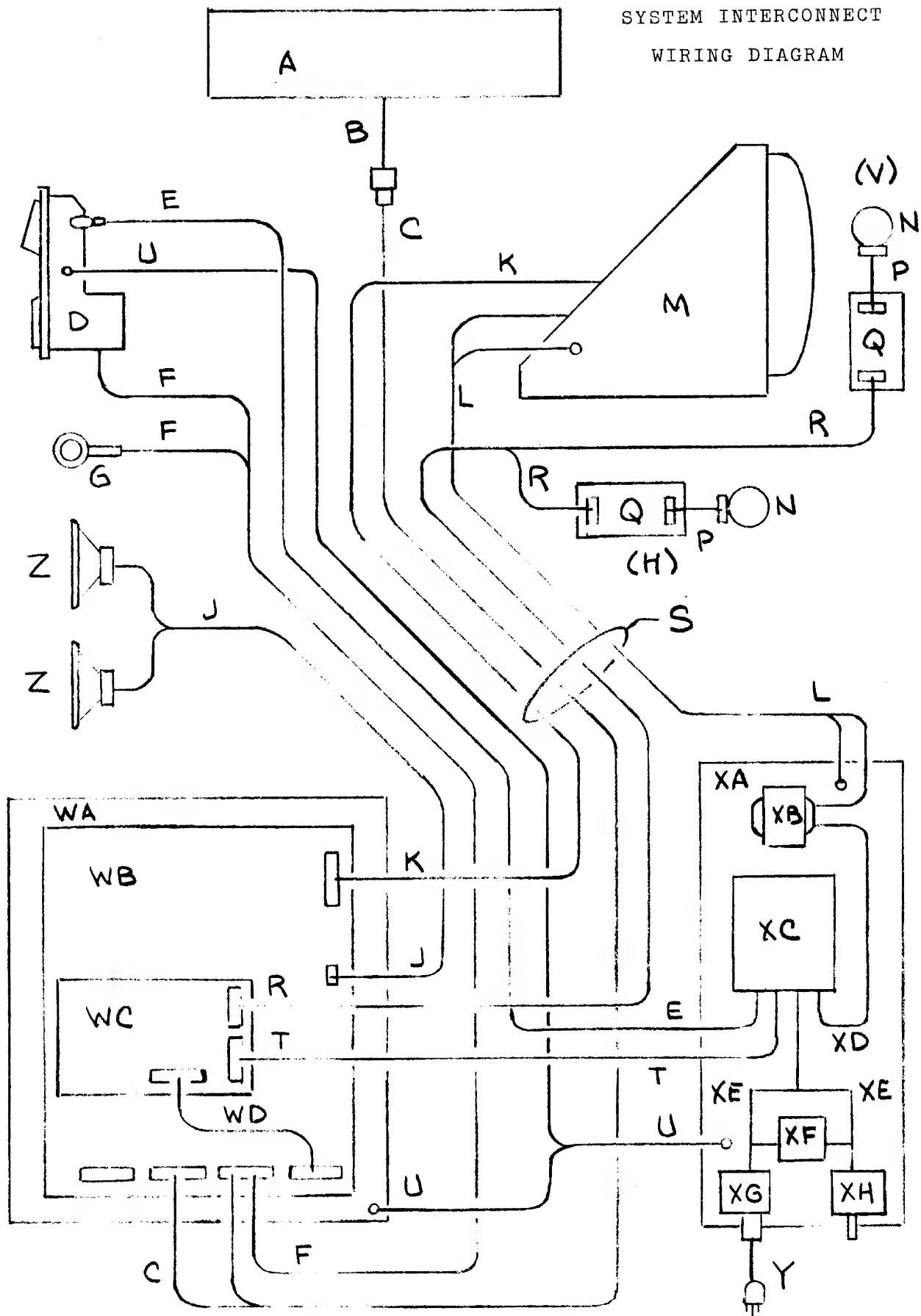
AC/DC POWER CONNECTION



CONTROL PANEL WIRING DIAGRAM

FIG. 2
Panel 40

SYSTEM INTERCONNECT
WIRING DIAGRAM



SYSTEM INTERCONNECT DIAGRAM

A. CONTROL PANEL ASSEMBLY 38-30025-01	FOR N,P AND Q: (H) IS HORIZONTAL (V) IS VERTICLE
B. CONTROL PANEL HARNESS 87-18011-01	N. SHAFT ENCODER 50-11575-01
C. CONTROL PANEL INTERFACE HARNESS	P. SHORT SHAFT ENCODER HARNESS WITH ECCE CARD CONNECTOR 87-18009-01
D. COIN DOOR ASSEMBLY WITHOUT VAULT 19-30025-01 SHORTENED COIN VAULT 20-30010-01	Q. SHAFT ENCODER DRIVER PRINTED CIRCUIT ASSEMBLY 81-16200-01
E. COIN DOOR LIGHT HARNESS 87-18001-01	R. SHAFT ENCODER INTERFACE HARNESS
F. COIN/SERVICE HARNESS 87-14052-01	S. MAIN HARNESS (MADE UP OF C,K,L,R AND WD) 87-18005-01
G. SERVICE SWITCH SHORT RED BUTTON 37-11192-02 LEAF SWITCH WITH BRACKET FOR SHORT BUTTON 37-11373-01 SERVICE SWITCH METAL BRACKET 20-13135-01	T. D.C.POWER HARNESS 87-16031 U. GROUND BRAID 87-16031-01 (V) VERTICLE
(H) HORIZONTAL	Y. A.C.POWER CORD 87-12143-01
J. SPEAKER HARNESS 87-18007-01	Z. 7-INCH SPEAKER 71-10834-01 4-INCH SPEAKER 71-10900-01
K. VIDEO HARNESS	6x9-INCH SPEAKER GRILL 20-12398-01
L. MONITOR POWER/ GROUND HARNESS	
M. MONITOR 39-10819-01	

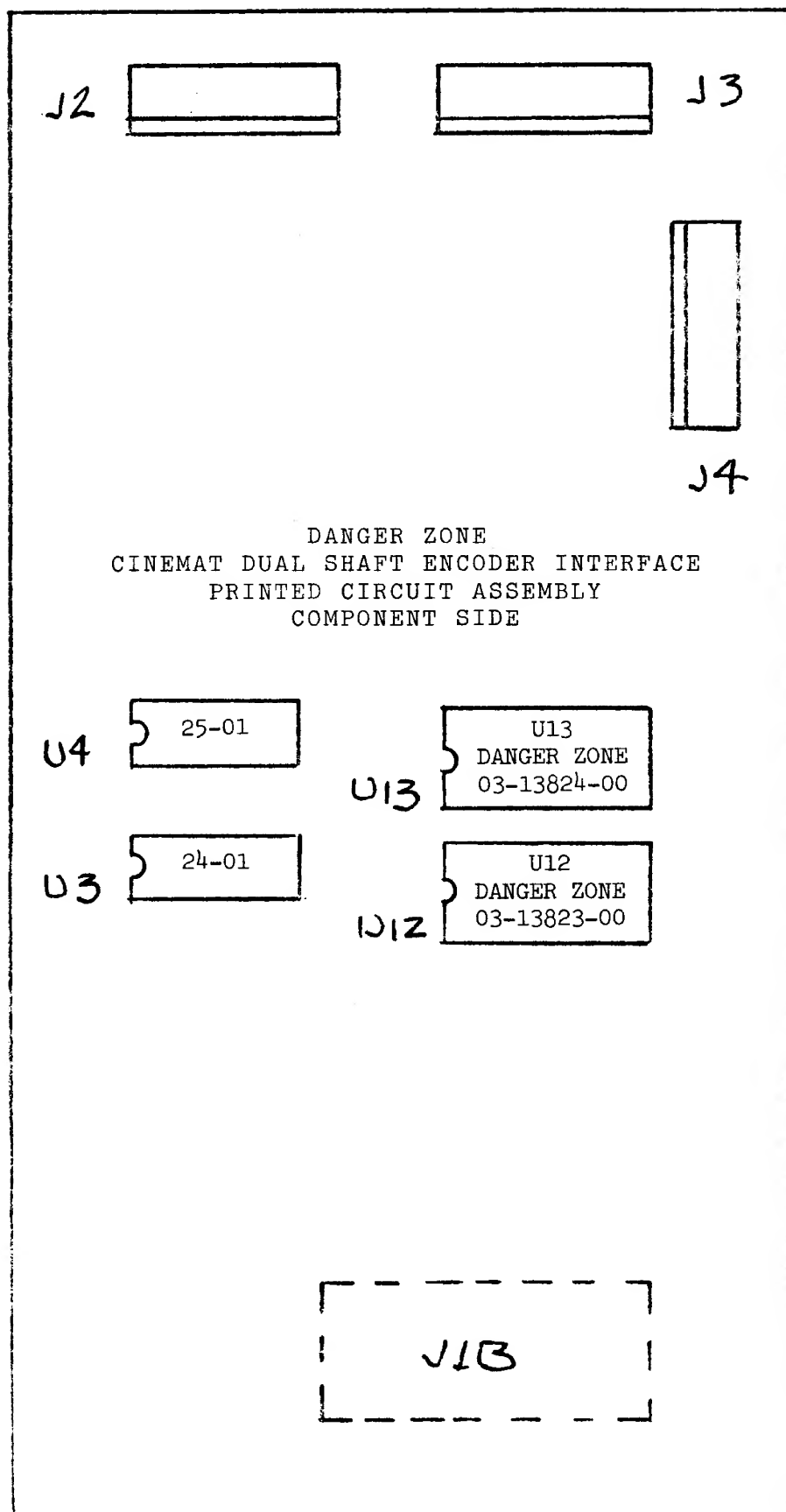


FIG. 5

MOUNTING DIAGRAM, DUAL SHAFT ENCODER BOARD

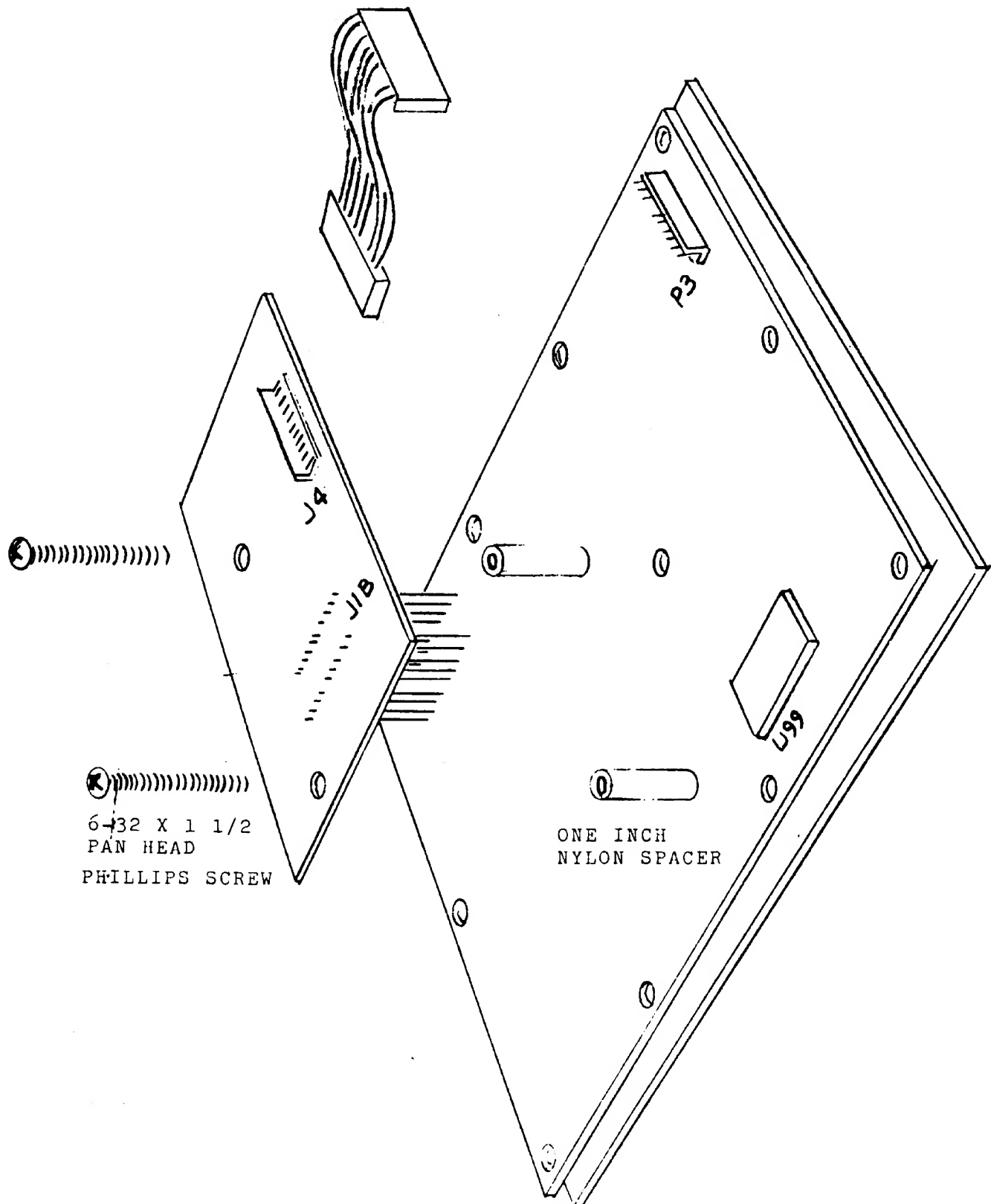


FIG. 6